UNIVERSITY OF CALIFORNIA

DEPARTMENT OF BACTERIOLOGY
BERKELEY 4, CALIFORNIA

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Dr. Joshua Lederberg
Department of Genetics
University of Wisconsin
Madison, Wisconsin

Dear Dr. Lederberg:

I have been very interested in your mutants of E. coli and have discussed the results with Barker and Stanier. The results are most perplexing and we can think of no "simple explanation" of any of them.

How do you test the organisms for fermentation of sugars? Is it done by inoculating cultures into tubes or by testing the ability of resting cells to ferment? Also, with regard to mutant W-145 (Lac_5), it is not clear whether it is able to ferment or to utilize the substrates involved in your experiments. The most attractive hypothesis for this strange association of characters would seem to be that the precursor of several enzymes or genes is lost in the mutation. This, however, is a dangerous hypothesis without better evidence. I can see no relation among the breakdown pathways of the three carbohydrates.

With regard to W-108 SL_1+, it would be interesting to know whether in fermenting lactose this organism uses only the galactose part of the molecule or both halves. We have been studying L. bulgaricus, which grows well on lactose but poorly on glucose media. In fact, glucose seems to inhibit its growth. We find that the organism ferments lactose, galactose, and glucose equally well in resting suspensions and exhibits no special enzymes other than lactase for lactose breakdown.

I have found no evidence for phosphorolysis of either maltose or trehalose. In spite of the fact that P. saccharophila uses trehalose very rapidly and glucose poorly when grown with the former sugar, there is no evidence of anything but trehalase activity. Findings such as these make one escape into metaphysical concepts of cell membrane permeability. Have you read Gottschalk's article in the last Wallerstein publications?

With regard to the Lac_1- and Lac_2- mutants, it would be extremely interesting to see whether dry cell preparations from these organisms will hydrolyze or attack lactose and β - methyl galactoside.

I am sorry to report that none of us has any of the carbohydrates you asked about. I realize that untangling the metabolic problems which the mutations have raised is going to be an enormous undertaking. I hope, however, that you will attempt to understand the physiology of some of the mutants before too much

confusion comes from the complicated genetic terminology. Perhaps next year I might be able to help you study some of the organisms, if you wish.

Are you going to the Minneapolis meetings in May? If you are, I would like very much to meet you and to discuss your very exciting discoveries.

Sincerely yours,

Michael Doudoroff

Michael Doudoroff, Ph.D.
Associate Professor

MD:M